

IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

1. **(Currently Amended)** A computer-readable storage medium configured to store a data structure, the data structure comprising:
 - a first lookup table having at least one entry, each of the at least one entry having an information storage portion; and
 - a second lookup table having at least one block of entries, each entry in the at least one block of entries storing next hop and prefix length information;wherein each at least one entry in the first lookup table is indexable by a segment of an IP destination address, the segment ~~being at least sixteen~~ **having a first number of bits long that is less than a total number of bits in the IP destination address,** the information storage portion of each of the at least one entry in the first lookup table stores next hop and prefix information when there is no route having a prefix matching the index of the entry and a prefix length greater than a predetermined value, the ~~[[data]]~~ **information** storage portion of each of the at least one entry in the first lookup table stores a **variable value K and a separate and distinct** value pointing to a block in the at least one block of entries in the second lookup table when there is a route having a prefix matching the index of the entry and a prefix length greater than the predetermined value, and each entry in the block is indexable by an offset of the IP destination address, the offset ~~being 32~~ **having a second number of K bits long that is less than or equal to the total number of bits less the first number of bits long of the segment, the size of the block thereby being a variable size of 2^K entries.**

2. (Original) The storage medium of claim 1, each of the at least one entry in the first lookup table including a marker bit indicating whether there is a route having a prefix matching the index of the entry and a prefix length greater than a predetermined value.
3. (Original) The storage medium of claim 1, wherein the storage medium is operatively connected to a configurable processor.
4. (Original) The storage medium of claim 1, wherein the segment length is 16 bits plus a number of bits necessary to uniquely determine an entry of one of the first and second tables corresponding to the IP destination address.
5. **(Currently Amended)** A computer-readable storage medium configured to store a data structure, the data structure comprising:
- a first lookup table having at least one entry, each of the at least one entry having a bitmap portion and an information storage portion; ~~and~~
 - a second lookup table having at least one entry, each entry in the at least one entry storing next hop and prefix length information; and
 - a third lookup table having at least one entry, the at least one entry including a pointer portion and a variable value K, wherein each at least one entry of the third lookup table is indexable by a segment portion of the IP destination address, and wherein when there is a route having a prefix matching the index of the at least one entry and a prefix length greater than a predetermined value, the pointer portion includes a pointer that is combined with K bits of the IP destination address following the segment portion to determine an index for the at least one entry in the first lookup table,**
- ~~wherein the at least one entry in the first lookup table is indexable by a first portion of an IP destination address, and~~ bits within the bitmap of the at least one entry are indexable by a second portion of the IP destination address,
- the information storage portion of each of the at least one entry stores next hop and prefix information when the total number of ones in the bitmap of the at least one entry is one of a given set of values, and

the information storage portion of each of the at least one entry information pointing to an entry in the second lookup table when the total number of ones in the bitmap of the at least one entry is not one of the given set of values; and
~~the first portion of the IP destination address is at least 16 bits long and the length of the second portion of the IP destination address is 32 bits less the length of the first portion.~~

6. (Original) The storage medium of claim 5, wherein the first set of values includes one and two.
7. (Original) The storage medium of claim 6, wherein:
 - the information storage portion of the at least one entry stores one set of next hop and prefix length information when the total number of ones in the bitmap of the at least one entry is one;
 - the information storage portion of the at least one entry stores two sets of next hop and prefix length information when the total number of ones in the bitmap of the at least one entry is two; and
 - the information storage portion of the at least one entry stores information pointing to an entry in the second lookup table when the total number of ones in the bitmap of the at least one entry is more than two.
8. (Original) A method of storing information in the data structure of claim 5, the method comprising:
 - determining for each entry in a group of entries in a data structure, whether a value of the entry is different from a value of a previous entry,
 - when the entry value is different from the previous entry value, storing a first bit value in a corresponding place in a bitmap corresponding to that group of entries; and
 - when the entry value is the same as a previous entry value, storing a second bit value different from the first bit value in the corresponding place;

when a number of ones in the bitmap is in a first set of values, storing next hop and prefix length information in an entry storing the bitmap, the next hop and prefix length information corresponding to entries in the bitmap; and
when a number of ones in the bitmap is in a second set of values, storing an index to next hop and prefix length information corresponding to the bitmap information stored in a second data structure in the entry storing the bitmap.

9. **(Currently Amended)** A method of performing route lookup and packet forwarding in a communications network, the method comprising:

receiving an incoming IP address and dividing the address into segment and offset portions;
using a value of the segment to index to a particular entry in a first data structure;
checking a marker bit of the entry;
if the marker bit is zero, obtaining next hop information and prefix length information for the IP address from the remaining bits of the entry;
if the marker bit is one,
 using **a pointer portion in** the remaining bits of the entry to index to a block of entries in a second data structure,
 extracting a variable value K from the remaining bits of the entry separate from the pointer portion,
 determining the offset portion of the IP address by extracting K bits from the IP address,
 within the block of entries in the second data structure, using the offset to index to a particular entry, and
 obtaining next hop and prefix length information from the indexed entry in the second data structure; and
using the next hop ~~and prefix length~~ information to forward a packet associated with the IP address to another location on a communications network.

10. **(Canceled)**

11. (Canceled)

12. (Canceled)

13. (Canceled)

14. (Original) A method of updating a data structure suitable for use in a route lookup system in a communications network, the method comprising:

receiving an IP route having an IP address component, prefix length component and next hop component;

checking a group of entries in a data structure indicated by the prefix length component, the group having a size determined by a length of the IP address less the prefix length; and

performing a longest match procedure to update the group of entries to have most specific next hop and prefix length information for the group of entries, **wherein updating includes determining and storing a variable value K in the data structure, and further including storing next hop and prefix information for certain of the updated group of entries entirely within a 2^K block of entries in another data structure;**

wherein checking includes

determining whether a given portion of an entry in the group of entries stores next hop and prefix information, or stores an index to a block of next hop and prefix information in **the** another data structure; and

obtaining prefix length and next hop information for the entry based on the determination result.

15. (Canceled)

16. (New) The storage medium of claim 1, wherein the offset comprises K bits of the IP destination address immediately following the segment in significant bit order, and wherein K is less than the total number of bits less the first number of bits.

17. (New) The storage medium of claim 5, wherein K is less than a total number of bits of the IP destination address less a number of bits comprising the segment portion.

18. (New) The method of claim 9, wherein the offset comprises K bits of the IP address immediately following the segment in significant bit order, and wherein K is less than a total number of bits of the IP address less the number of bits comprising the segment.

19. (New) A computer-readable storage medium configured to store a data structure, the data structure comprising:

- a first lookup table having at least two entries, each of the at least two entries having an information storage portion; and

- a second lookup table having at least two blocks of entries, each entry in the at least two blocks of entries storing next hop information;

wherein each of the at least two entries in the first lookup table is indexable by a segment portion of an IP destination address,

the information storage portion of a first one of the at least two entries in the first lookup table stores a value K1 and a first pointer when there is a first route having a prefix matching the index of the first entry and a prefix length greater than a predetermined value, the first pointer pointing to a first one of the two blocks of entries in the second lookup table,

the information storage portion of a second one of the at least two entries in the first lookup table stores a value K2 and a second pointer when there is a second route having a prefix matching the index of the second entry and a prefix length greater than a predetermined value, the second pointer pointing to a second one of the two blocks of entries in the second lookup table,

the values K1 and K2 being different,

a first entry in the first block is indexable by K1 bits following the segment portion of the IP destination address, and
the second entry in the second block is indexable by K2 bits following the segment portion of the IP destination address.